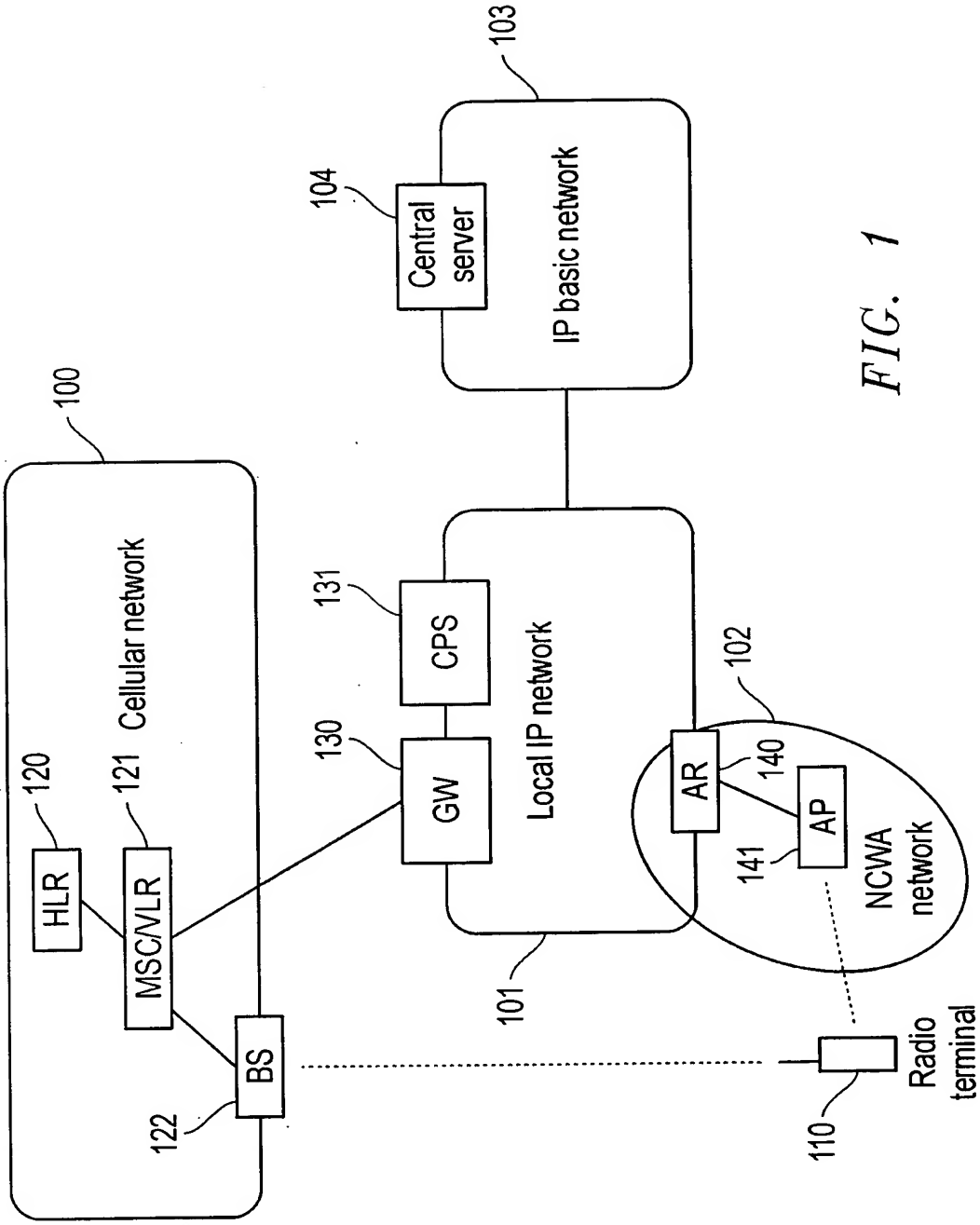
100
Cellular network
120
HLR
121
MSC/VLR
122
BS
130
GW
131
CPS
Local IP network
101
102
AR
140
AP
141
NCWA network
110
Radio terminal
104
Central server
103
IP basic network

FIG. 1

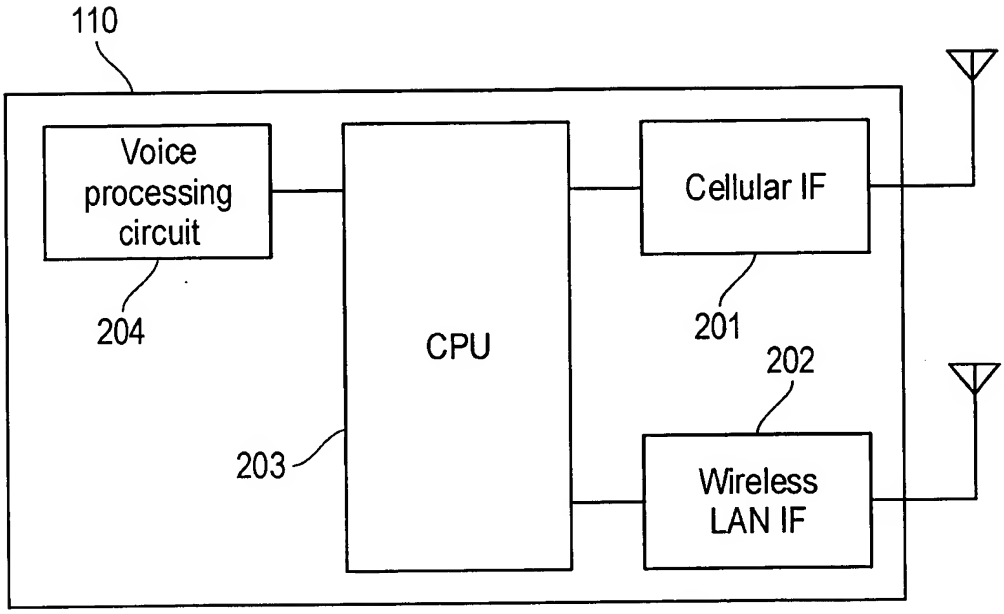
110
Voice processing circuit
204
CPU
203
Cellular IF
201
202
Wireless LAN IF

FIG. 2

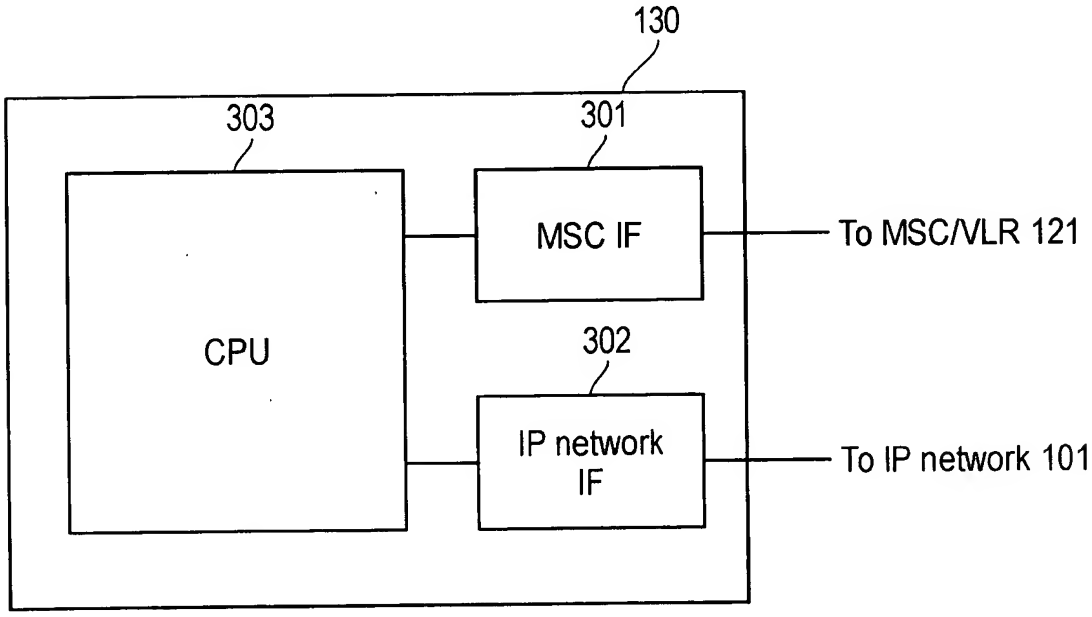
130
303
301
CPU
MSC IF
To MSC/VLR 121
302
IP network IF
To IP network 101

FIG. 3

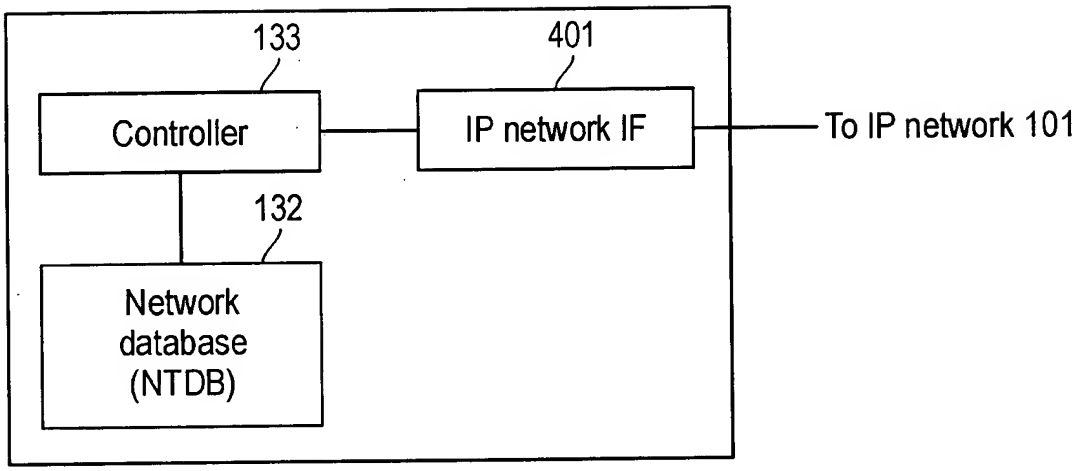
133
401
Controller
IP network IF
To IP network 101
132
Network database (NTDB)

FIG. 4

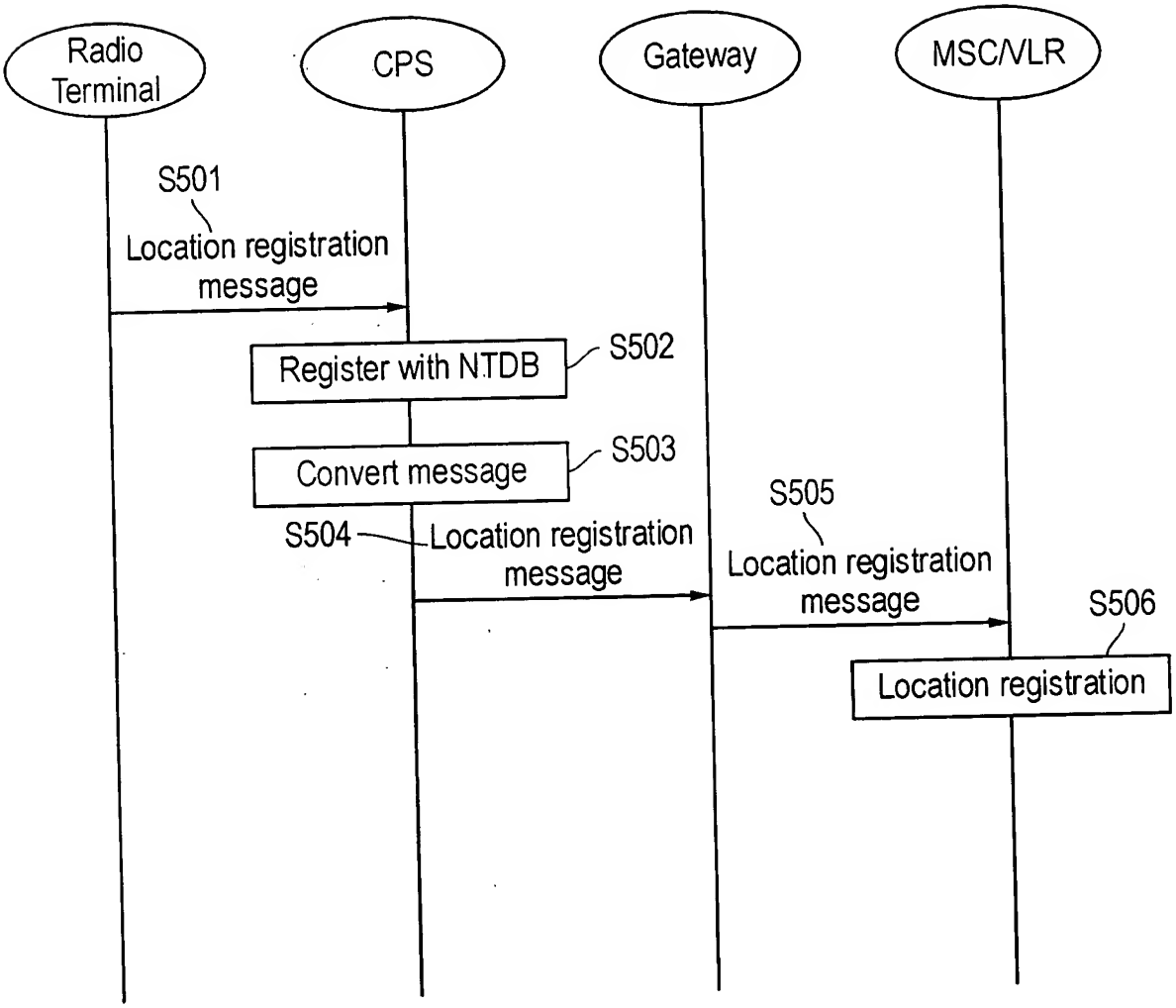
Radio Terminal
CPS
Gateway
MSC/VLR
S501
Location registration message
Register with NTDB
S502
Convert message
S503
S504
Location registration message
S505
Location registration message
S506
Location registration

FIG. 5

601 Entry No.	602 MSI SDN	603 IMSI (or TMIS, p-TMSI, IMEI)	604 IP address
1	09099999XXX	441 YY 555 XXX XXXX	192. 168. 0. 10
2	09099999XXX	441 YY 554 XXX XXXX	192. 168. 0. 11
:	:	:	:

FIG. 6

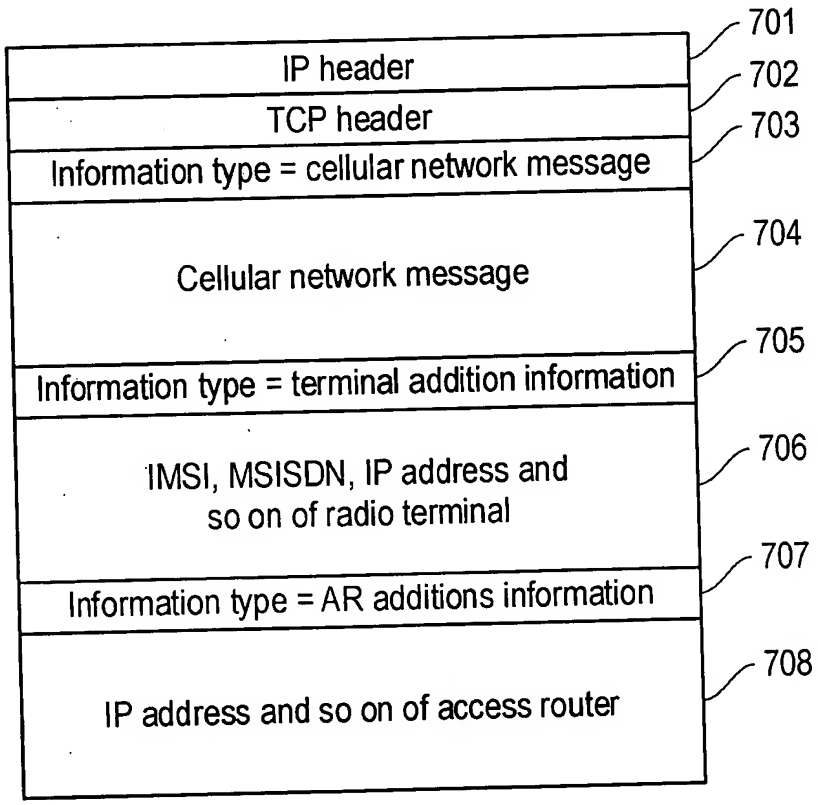

FIG. 7

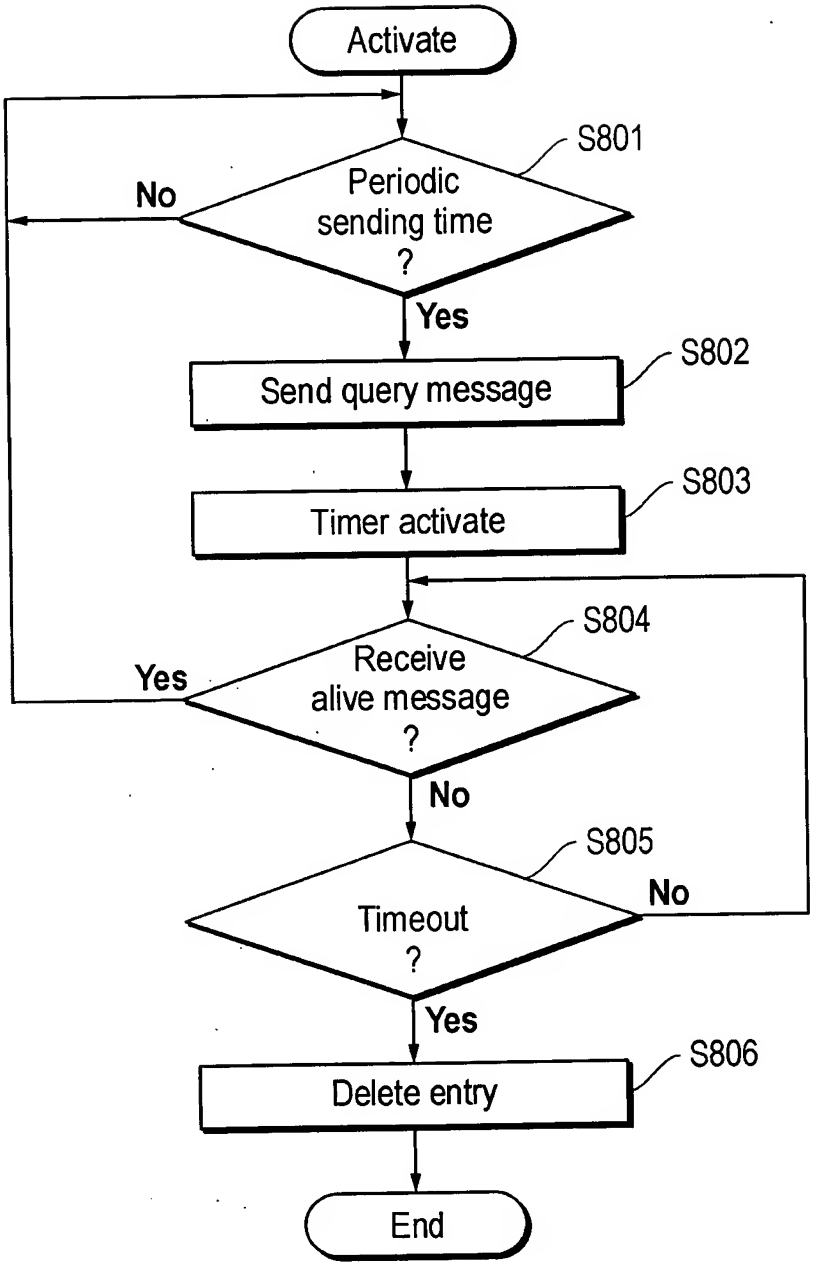
Activate
S801
Periodic sending time ?
No
Yes
S802
Send query message
S803
Timer activate
S804
Receive alive message ?
Yes
No
S805
Timeout ?
No
Yes
S806
Delete entry
End

FIG. 8

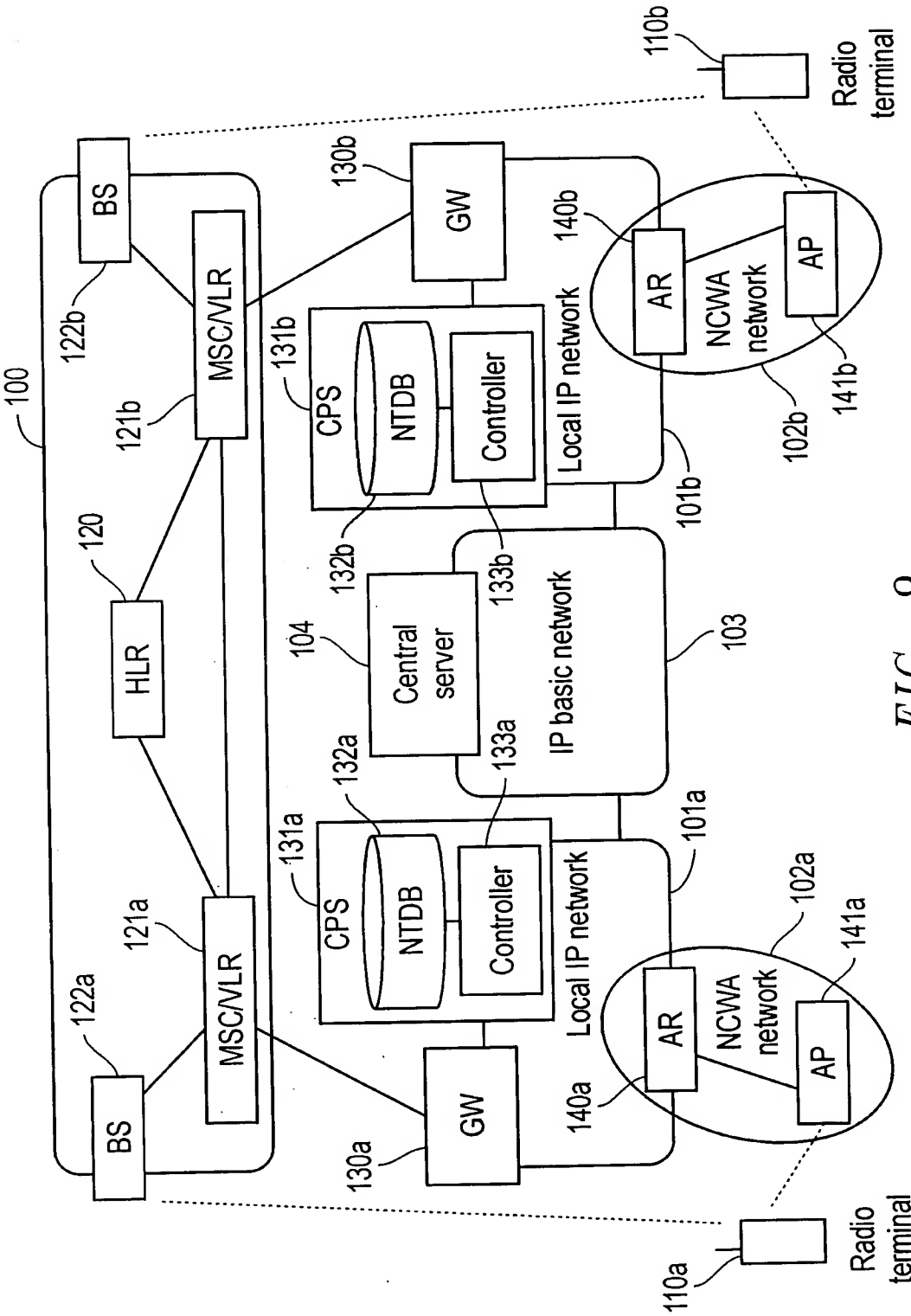
100
BS
122b
MSC/VLR
121b
120
HLR
121a
MSC/VLR
122a
BS
130b
GW
131b
CPS
NTDB
Controller
132b
133b
104
Central server
IP basic network
103
132a
133a
131a
CPS
NTDB
Controller
Local IP network
101a
130a
GW
140a
AR
NCWA network
AP
102a
141a
110a
Radio terminal
Local IP network
101b
140b
AR
NCWA network
AP
102b
141b
110b
Radio terminal

FIG. 9

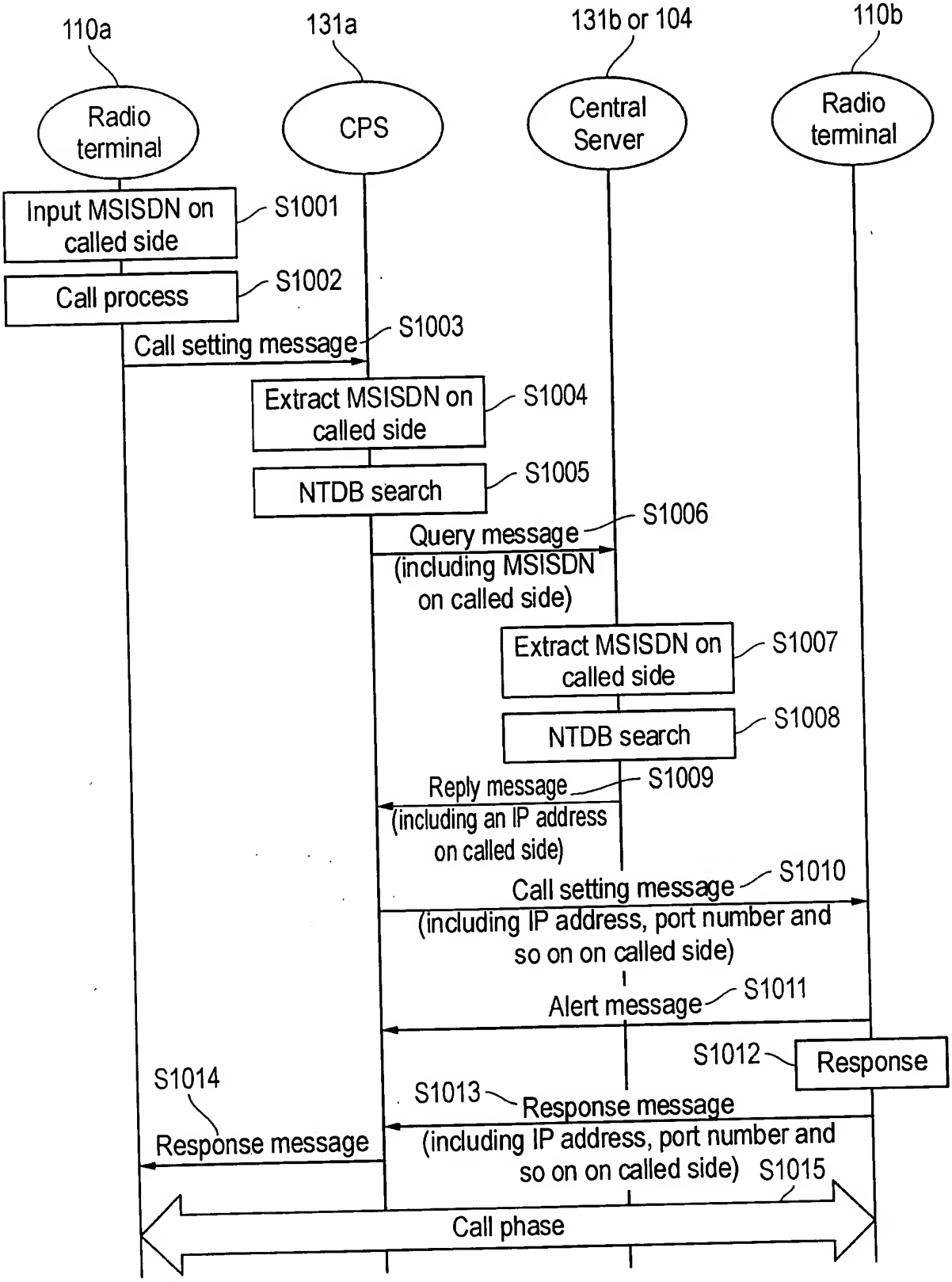
110a
131a
131b or 104
110b
Radio terminal
CPS
Central Server
Radio terminal
Input MSISDN on called side
S1001
Call process
S1002
Call setting message
S1003
Extract MSISDN on called side
S1004
NTDB search
S1005
Query message
(including MSISDN on called side)
S1006
Extract MSISDN on called side
S1007
NTDB search
S1008
Reply message
(including an IP address on called side)
S1009
Call setting message
(including IP address, port number and so on on called side)
S1010
Alert message
S1011
S1012
Response
S1013
Response message
(including IP address, port number and so on on called side)
S1014
Response message
S1015
Call phase

FIG. 10

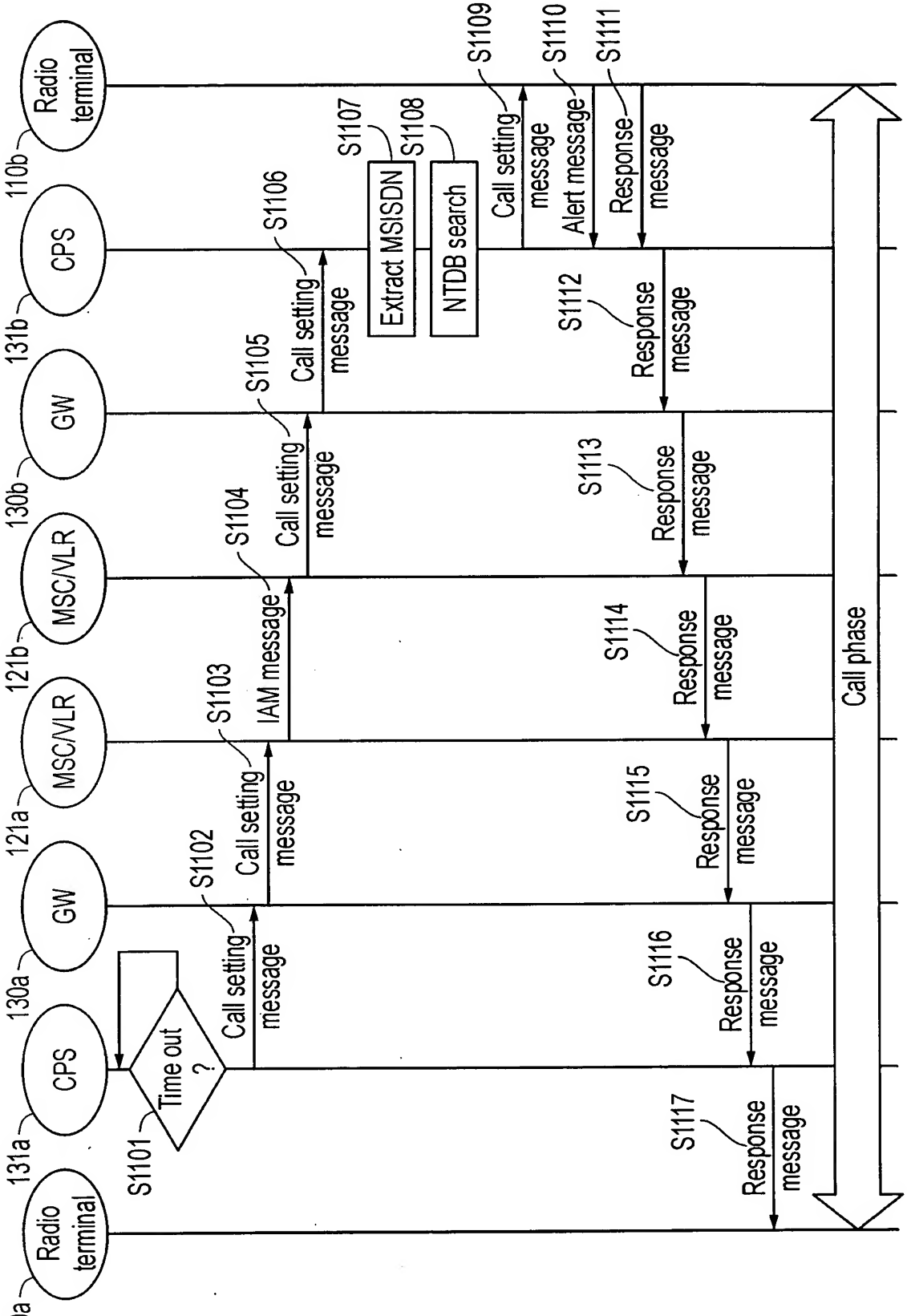
110a
Radio terminal
131a
CPS
130a
GW
121a
MSC/VLR
121b
MSC/VLR
130b
GW
131b
CPS
110b
Radio terminal
S1101
Time out ?
S1102
Call setting message
S1103
IAM message
S1104
Call setting message
S1105
Call setting message
S1106
Call setting message
S1107
Extract MSISDN
S1108
NTDB search
S1109
Call setting message
S1110
Alert message
S1111
Response message
S1112
Response message
S1113
Response message
S1114
Response message
S1115
Response message
S1116
Response message
S1117
Response message
Call phase

FIG. 11

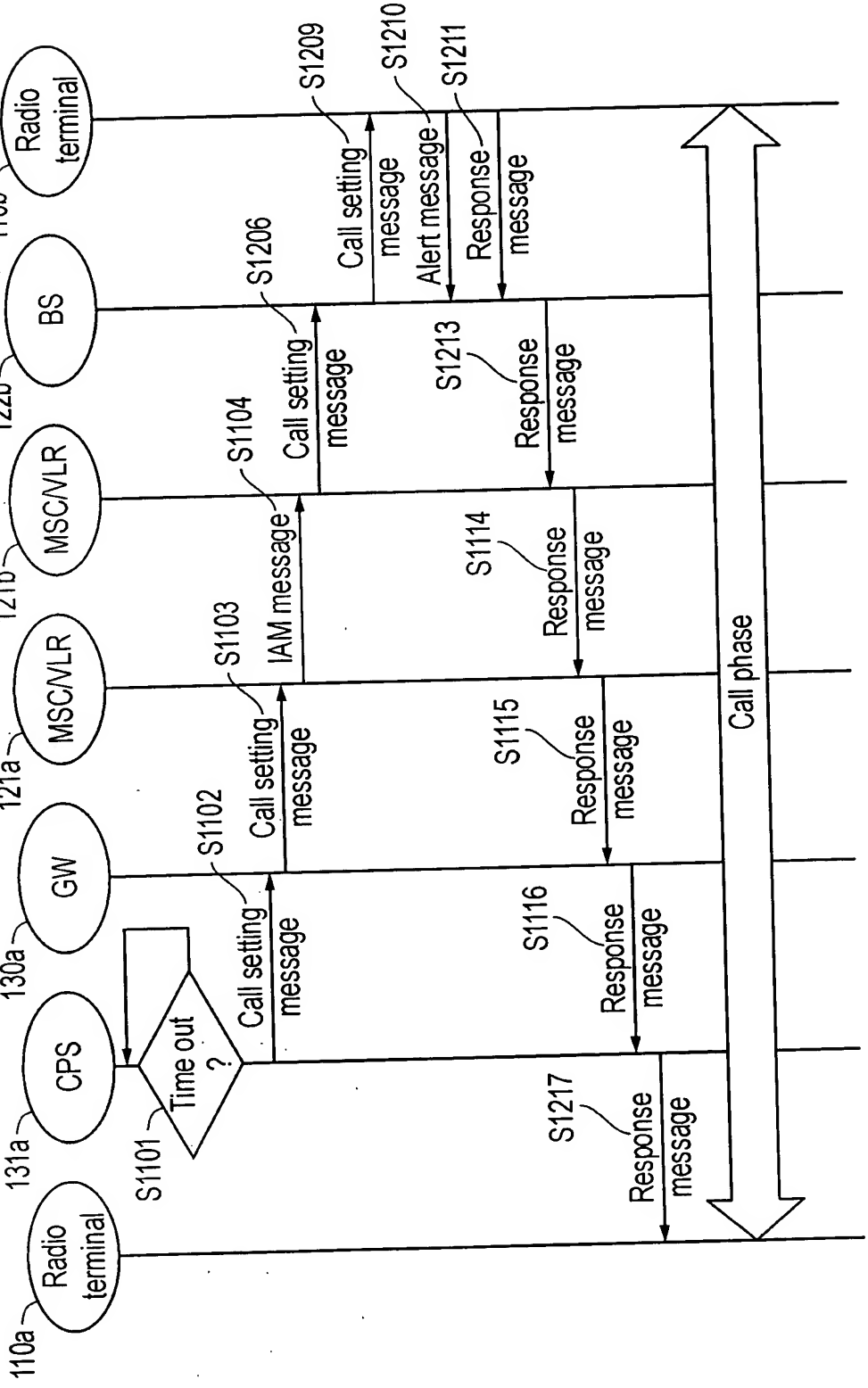
110a
Radio terminal
131a
CPS
130a
GW
121a
MSC/VLR
121b
MSC/VLR
122b
BS
110b
Radio terminal
S1101
Time out ?
S1102
Call setting message
S1103
IAM message
S1104
Call setting message
S1206
Call setting message
S1209
Call setting message
S1210
Alert message
S1211
Response message
S1213
Response message
S1114
Response message
S1115
Response message
S1116
Response message
S1217
Response message
Call phase

FIG. 12

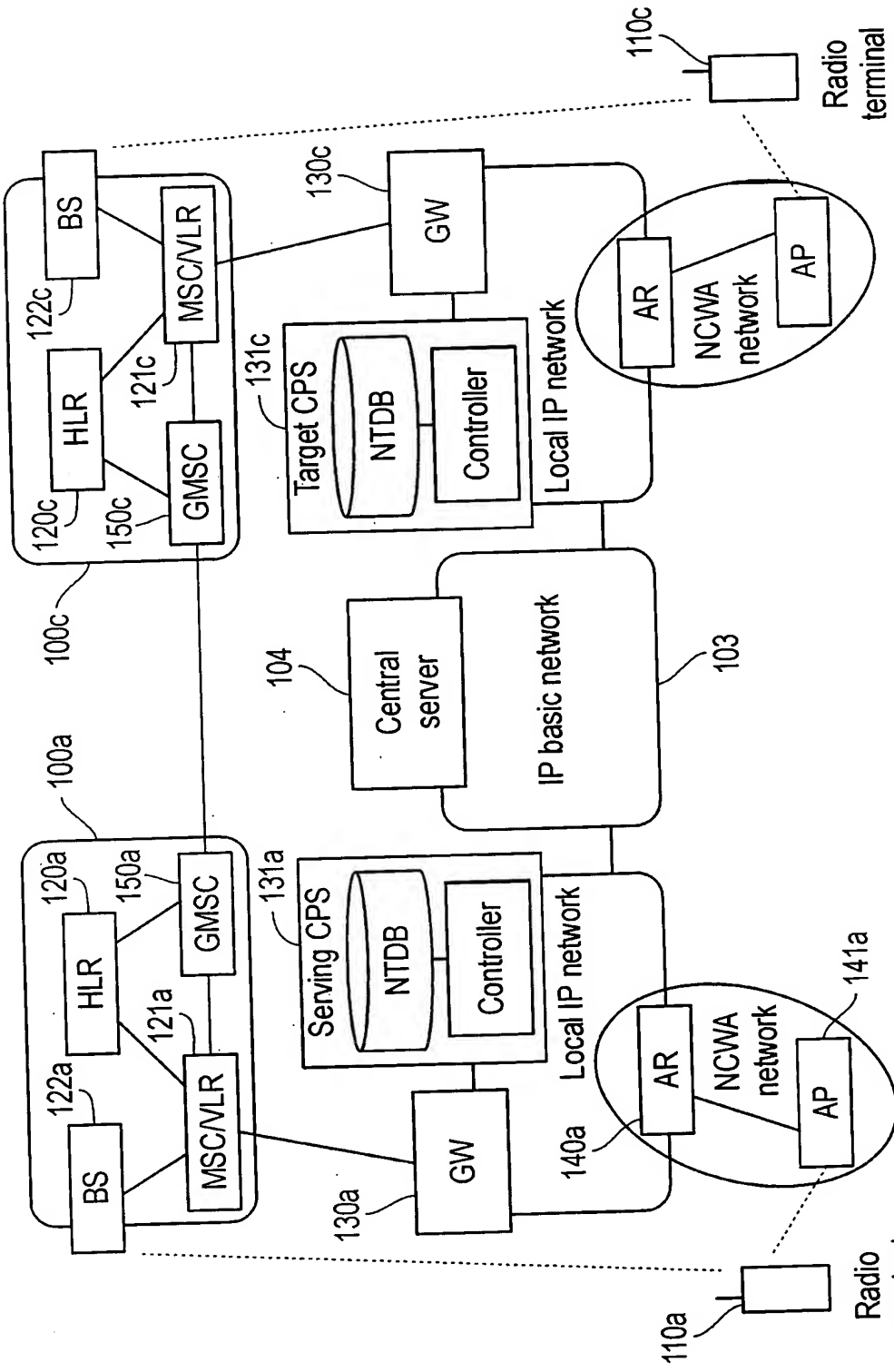
100a
100c
103
104
110a
110c
120a
120c
121a
121c
122a
122c
130a
130c
131a
131c
140a
141a
150a
150c
BS
HLR
GMSC
MSC/VLR
GW
AR
AP
NCWA network
Radio terminal
Central server
IP basic network
Serving CPS
Target CPS
NTDB
Controller
Local IP network

FIG. 13

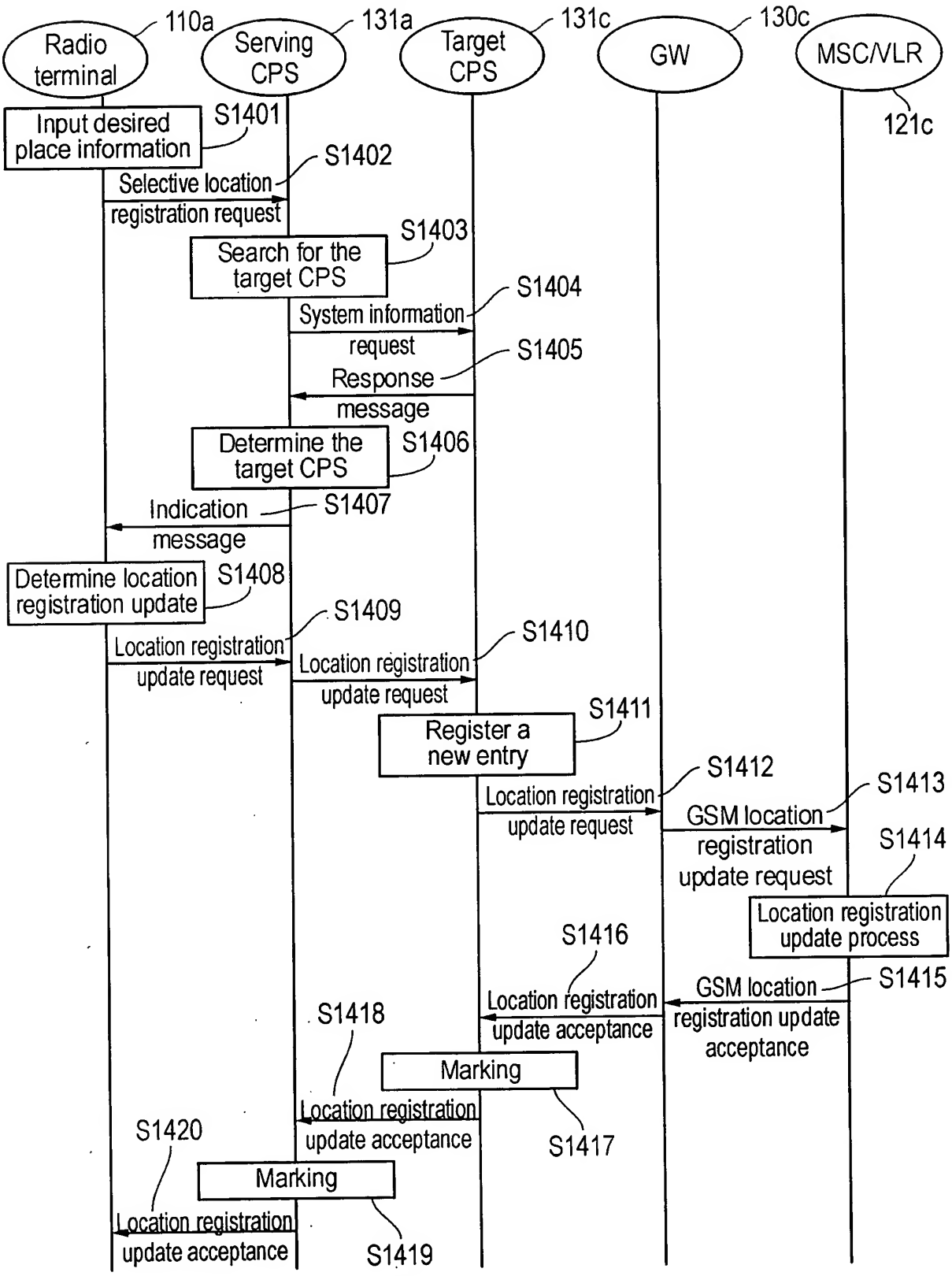
Radio terminal
110a
Serving CPS
131a
Target CPS
131c
GW
130c
MSC/VLR
121c
Input desired place information
S1401
Selective location registration request
S1402
Search for the target CPS
S1403
System information request
S1404
Response message
S1405
Determine the target CPS
S1406
Indication message
S1407
Determine location registration update
S1408
Location registration update request
S1409
Location registration update request
S1410
Register a new entry
S1411
Location registration update request
S1412
GSM location registration update request
S1413
Location registration update process
S1414
Location registration update acceptance
S1416
GSM location registration update acceptance
S1415
Marking
S1417
Location registration update acceptance
S1418
Marking
S1419
Location registration update acceptance
S1420

FIG. 14

1501 1502

Country number (area code)	Candidate CPS
81	CPS_Tokyo_100, CPS_Tokyo_101, CPS_Tokyo_102, CPS_Osaka_100
81-3	CPS_Tokyo_101, CPS_Tokyo_102
81-6	CPS_Osaka_100
46	CPS_Stockholm_100, CPS_Stockholm_101
1-212	CPS_NewYork_100, CPS_NewYork_101
1-510	CPS_SanFrancisco_100
33	CPS_Paris_100, CPS_Paris_101
44	CPS_London_100, CPS_London_101, CPS_London_102,
------	------

FIG. 15

Entry No.	MSISDN	IMSI	IP address	1601 Selective location registration	1602 Target CPS name	1603 Target CPS IP address
1	09099999XXX	441 YY 555 XXX XXXX	192. 168. 0. 10	1	CPS_Stockholm_100	XXX. 168. 0. 15
2	09099999XXX	441 YY 554 XXX XXXX	192. 168. 0. 11	0	-	-
:	:	:	:	:	:	:

FIG. 16

Entry No.	MSISDN	IMSI	IP address	1701 Selective location registration	1702 Serving CPS name	1703 Serving CPS IP address
1	819099999XXX	441 YY 555 XXX XXXX	192. 168. 0. 10	1	CPS_Tokyo_100	YYY. 168. 0. 15
2	819099999XXX	441 YY 554 XXX XXXX	192. 168. 0. 11	0	-	-
:	:	:	:	:	:	:

FIG. 17

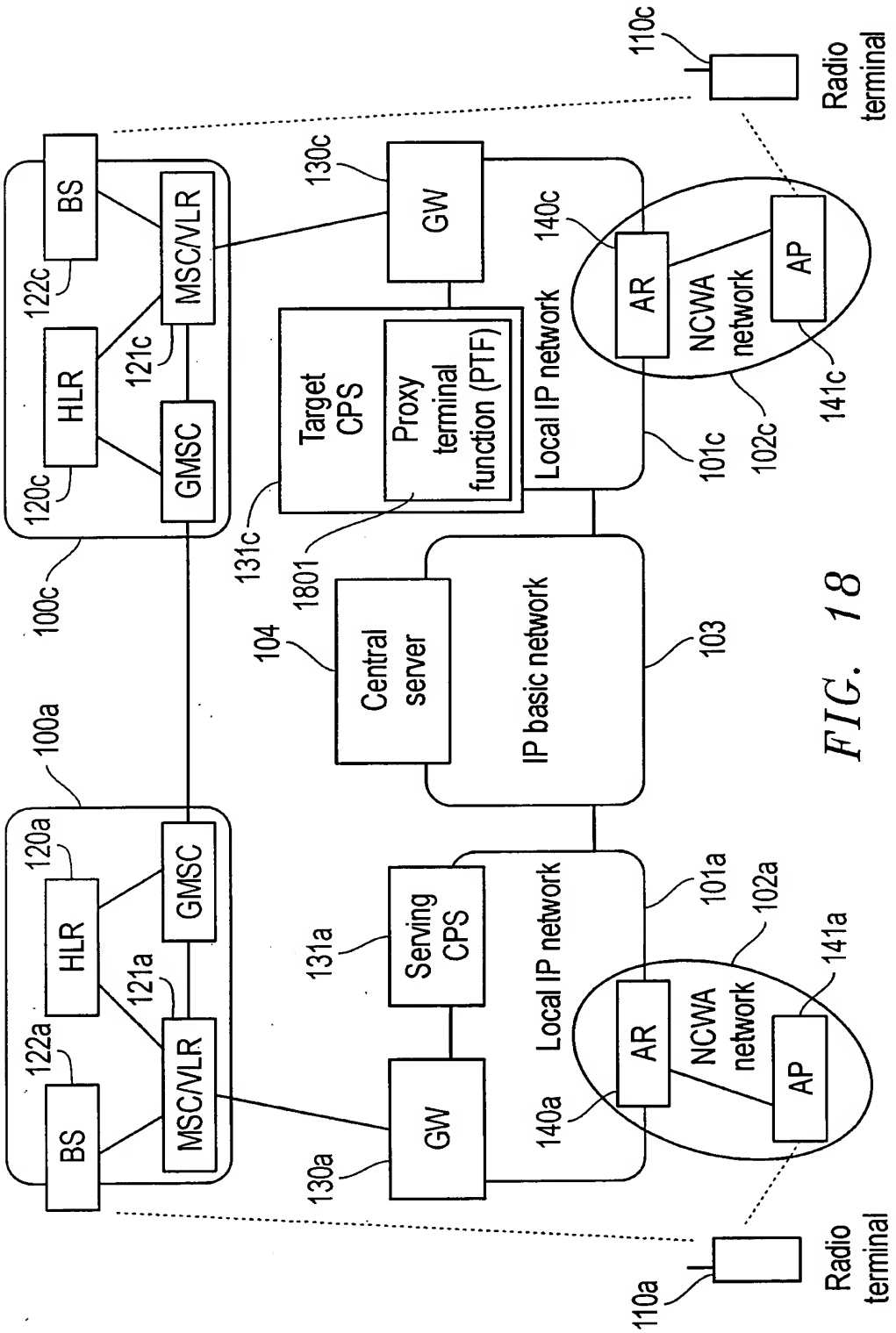
Radio terminal
110c
BS
122c
MSC/VLR
121c
HLR
120c
GMSC
100c
130c
GW
Target CPS
Proxy terminal function (PTF)
131c
1801
Local IP network
140c
AR
NCWA network
AP
141c
101c
102c
104
Central server
IP basic network
103
100a
120a
HLR
GMSC
121a
122a
BS
MSC/VLR
131a
Serving CPS
GW
130a
Local IP network
140a
AR
NCWA network
AP
141a
101a
102a
110a
Radio terminal

FIG. 18

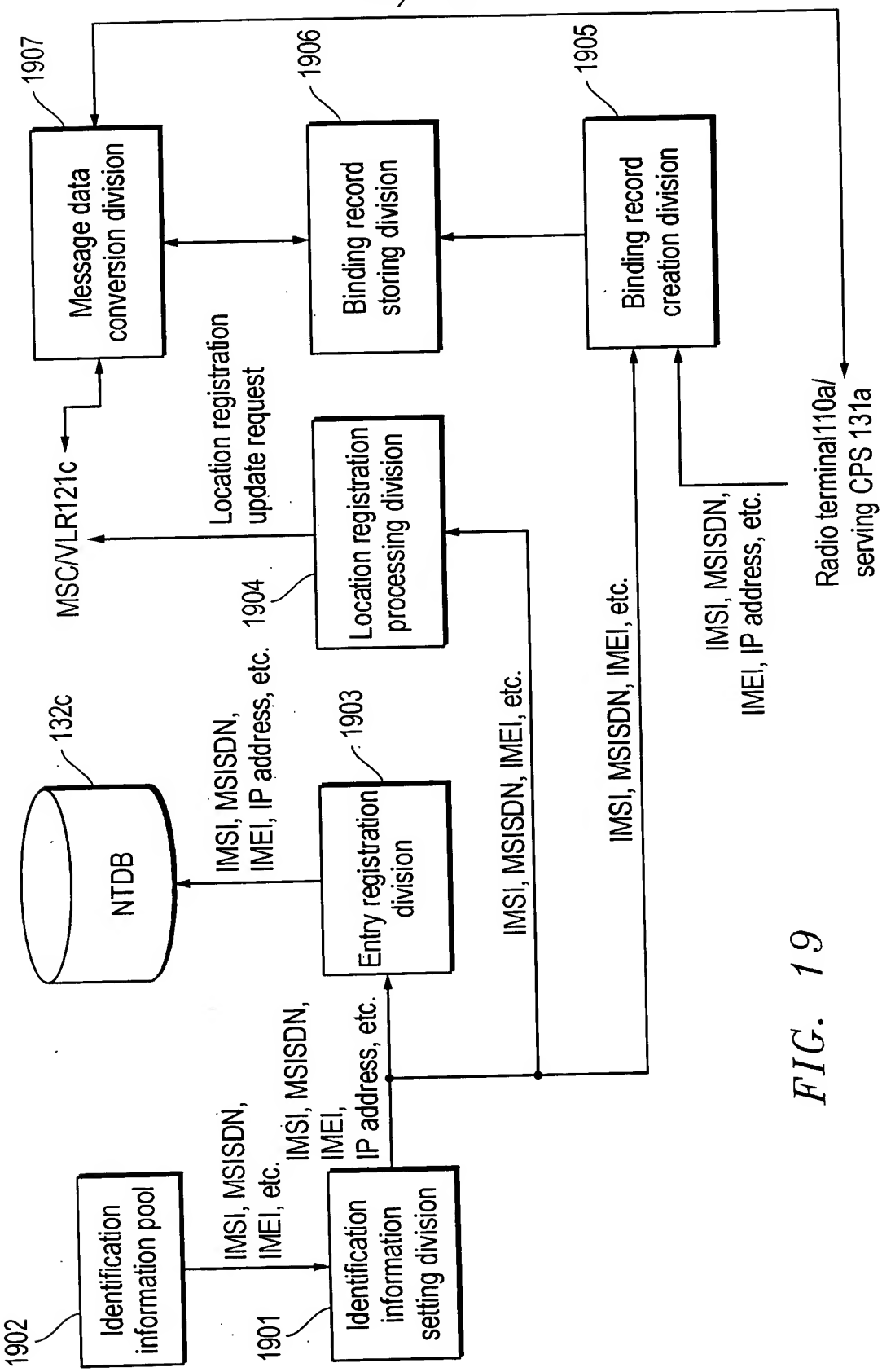
1907
Message data conversion division
1906
Binding record storing division
1905
Binding record creation division
Radio terminal110a/ serving CPS 131a
MSC/VLR121c
Location registration update request
1904
Location registration processing division
IMSI, MSISDN, IMEI, etc.
IMSI, MSISDN, IMEI, IP address, etc.
IMSI, MSISDN, IMEI, etc.
132c
NTDB
1903
Entry registration division
IMSI, MSISDN, IMEI, IP address, etc.
IMSI, MSISDN, IMEI, etc.
1902
Identification information pool
1901
Identification information setting division

FIG. 19

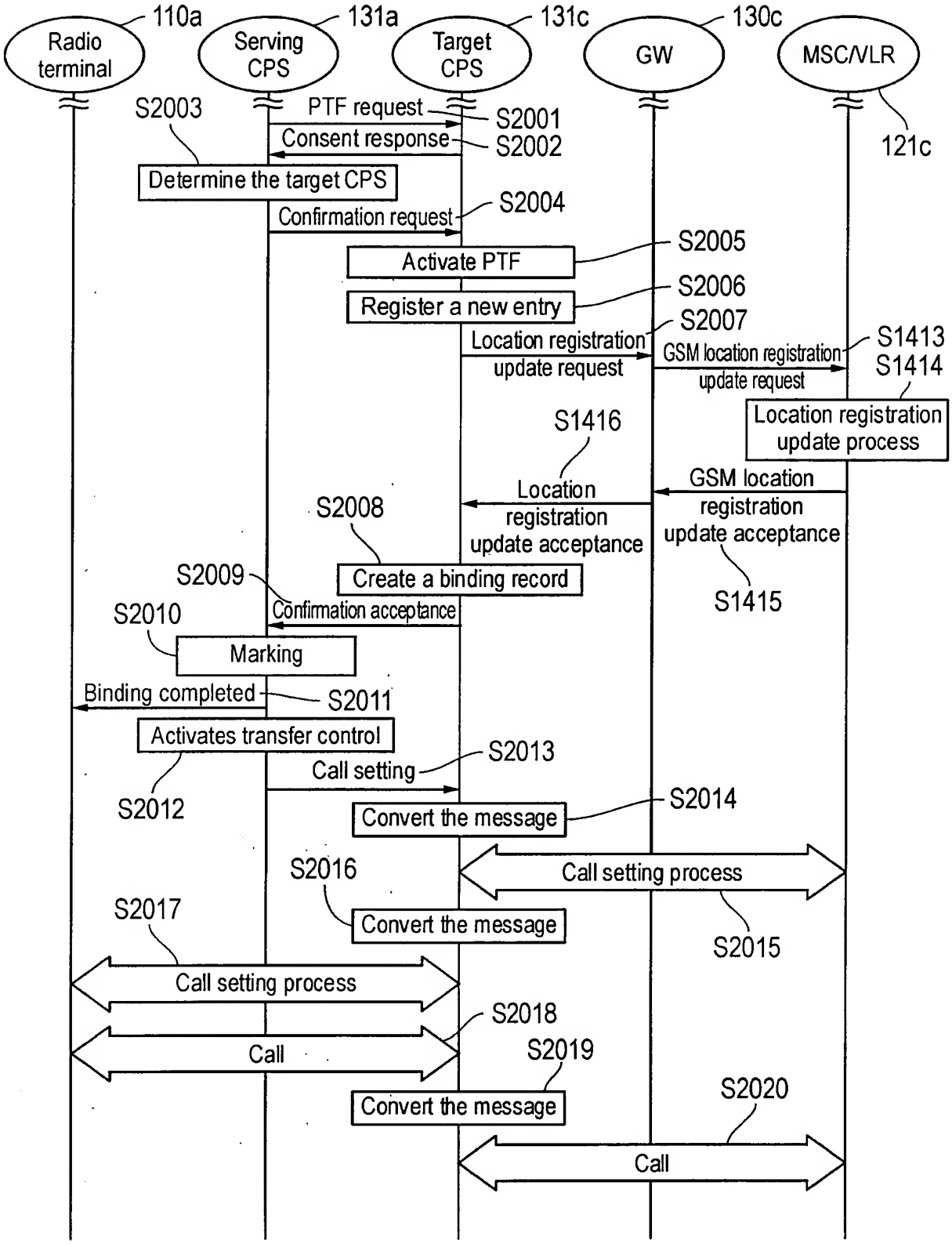
Radio terminal
110a
Serving CPS
131a
Target CPS
131c
GW
130c
MSC/VLR
121c
S2003
PTF request
S2001
Consent response
S2002
Determine the target CPS
Confirmation request
S2004
Activate PTF
S2005
Register a new entry
S2006
Location registration update request
S2007
GSM location registration update request
S1413
S1414
Location registration update process
S1416
Location registration update acceptance
GSM location registration update acceptance
S1415
S2008
Create a binding record
S2009
Confirmation acceptance
S2010
Marking
Binding completed
S2011
Activates transfer control
S2012
Call setting
S2013
Convert the message
S2014
Call setting process
S2015
S2016
Convert the message
S2017
Call setting process
S2018
Call
S2019
Convert the message
S2020
Call

FIG. 20

Entry No.	MSISDN	IMSI	IP address	2101 PTF Activate	2102 Target CPS IP address	2103 Proxy terminal IMSI
1	09099999XXX	441 YY 555 XXX XXXX	192. 168. 0. 10	1	YYY. 168. 0. 15	240 AA11 XXX XXXX
2	09099999XXX	441 YY 554 XXX XXXX	192. 168. 0. 11	0	-	-
:	:	:	:	:	:	:

FIG. 21